



**Third Five-Year Review Report**

**for**

**Lake Sandy Jo Superfund Site**

**Gary, Lake County, Indiana**

**September 2006**

**PREPARED BY:**

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# Five-Year Review Report

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## **List of Acronyms**

ARARs	Applicable or Relevant and Appropriate Requirements
EPA	United States Environmental Protection Agency
GHWC	Gary Hobart Water Company
IAC	Indiana Administrative Code
IC	Institutional Control
IDEM	Indiana Department of Environmental Management
LSJ	Lake Sandy Jo Superfund Site
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation & Maintenance
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PCOR	Preliminary Close Out Report
ppb	Parts per billion
RA	Remedial Action
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SDMS	Superfund Documents Management System
SDWA	Safe Drinking Water Act
SVOC	Semi-Volatile Organic Compound
THF	Tetrahydrofuran
TIC	Tentatively Identified Compound
UU/UE	Unlimited Use or Unrestricted Exposure.
VOC	Volatile Organic Compound

## **Executive Summary**

The remedial actions conducted at Lake Sandy Jo Superfund Site, located in Gary, Indiana, are protective of human health and the environment in the short term. However, because the required institutional controls have not been implemented, the Site is not protective of human health and the environment for the long term. The institutional controls must do the following: 1) restrict land use such that it would not compromise the integrity of the remedial action and not allow for direct exposure to contaminants; and 2) prohibit the use of groundwater at those residences that were provided an alternative water supply under the remedial action and an area north of the Site.

The assessment conducted for this five-year review found that all other components of the remedy were implemented in accordance with the requirements of the 1986 Record of Decision. The remedy is comprised of an on-site disposal of excavated sediments, construction of a soil cover, installation of a groundwater monitoring system, an alternative water supply to surrounding residents and implementation of institutional controls to ensure that the other components remained protective in the long term. The Site reached construction completion with the signing of the Preliminary Close Out Report in September 1994.

This is the third five-year review for the Lake Sandy Jo Superfund Site. The first five-year review was completed in January 1996 and the second five-year review was completed in September 2001. The next five-year review will be required by September 2011, five years from the signature date from this review.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Lake Sandy Jo (M&M Landfill)		
EPA ID (from WasteLAN): IND980500524		
Region: 5	State: IN	City/County: Gary, Lake County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Construction completion date: 09 / 20 / 1994
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
Author name: Erica Islas		
Author title: Remedial Project Manager		Author affiliation: U.S. EPA, Region 5
Review period: 10 / 03 / 2005 to 07 / 28 / 2006		
Date(s) of site inspection: 04 / 18 / 2006		
Type of review: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Post-SARA</span> <span><input checked="" type="checkbox"/> Pre-SARA</span> <span><input type="checkbox"/> NPL-Removal only</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Non-NPL Remedial Action Site</span> <span><input type="checkbox"/> NPL State/Tribe-lead</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Regional Discretion</span> </div>		
Review number: <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input checked="" type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Actual RA Onsite Construction at OU # _____</span> <span><input type="checkbox"/> Actual RA Start at OU# _____</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Construction Completion</span> <span><input checked="" type="checkbox"/> Previous Five-Year Review Report</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Other (specify)</span> </div>		
Triggering action date (from WasteLAN): 09 / 28 / 2001		
Due date (five years after triggering action date): 09 / 28 / 2006		

## **Five-Year Review Summary Form, cont'd.**

### **Issues:**

*In order for the remedy to be protective in the long-term, effective institutional controls must be implemented and maintained.*

### **Recommendations:**

*Develop and implement an institutional controls action plan which will plan to do the following:*

*Evaluate and determine which restrictions are appropriate for each area of the Site*

*Ensure that deed restrictions are recorded for remaining properties at the Site*

*Request an additional groundwater ordinance to be put into place to restrict all groundwater use in both on-site and off-site areas affected by the remedial action and as designated by ROD*

*Ensure effective procedures are in-place for long-term stewardship at the Site*

### **Protectiveness Statement(s):**

*The remedial actions for OU-1 and OU-2 are protective of human health and the environment in the short term. However, because the required institutional controls have not been implemented, the Site is not protective of human health and the environment in the long term. The institutional controls must do the following: 1) restrict land use such that it would not compromise the integrity of the remedy and allow for direct exposure to contaminants; and 2) prohibit the use of groundwater at those residences who were provided an alternative water supply under the remedial action and an area north of the Site.*

# Five-Year Review Report

## I. Introduction

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

The Agency is preparing this five-year review pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR § 300.430(f) (4) (ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action*

The United States Environmental Protection Agency (EPA) Region 5 has conducted a five-year review of the remedial actions implemented at the Lake Sandy Jo Superfund Site (“LSJ” or “the Site”), located in Gary, Lake County, Indiana. This review was conducted by the Remedial Project Manager (RPM) from October 1, 2005 to July 28, 2006. This report documents the results of the review.

This review is the third five-year review for LSJ. The triggering action for this policy review is the date of the signature of the second five-year review as shown in EPA’s WasteLAN database: September 28, 2001. This review is required because hazardous substances, pollutants, or contaminants are left onsite above levels that allow for unlimited use and unrestricted exposure (UU/UE).



## II. Site Chronology.

**Table 1: Chronology of Site Events**

Event	Date
Sand and gravel pit dug to support construction of adjacent expressway	1960s
Gemin Corporation obtained rights to fill pit	1971-1975
Pit operated M&M Landfill	1976-1980
Landfill operations ceased	May 1980
Proposed to NPL	December 30, 1982
Final Listing on NPL	September 8, 1983
Removal Action to erect security fence	April 1986
Combined Remedial Investigation/Feasibility Study	August 1986
Record of Decision	September 1986
Remedial Design Start OU#1 – Soil Cover	July 10, 1990
Remedial Design Completed OU#1 – Soil Cover	December 11, 1990
Remedial Design Start OU#2 – Alternate Water Supply	March 5, 1987
Remedial Design Completed OU#2 – Alternate Water Supply	July 29, 1988
Remedial Action OU#1 Start	September 21, 1988
Remedial Action OU#1 Complete	December 5, 1990
Remedial Action OU#2 Start	September 28, 1987
Remedial Action OU#2 Complete	September 15, 1994
Preliminary Close Out Report/Construction Complete	September 20, 1994
First Five-Year Review Complete	January 16, 1996
Second Five-Year Review Complete	September 28, 2001

### **III. Background**

#### **Physical Characteristics**

LSJ is located at 3615 West 25<sup>th</sup> Avenue in northern Lake County, Indiana. It encompasses 50 acres in a low-density residential area of Gary, Indiana and is bordered by Interstate-80/94 to the south (see Attachment 1- Site Location Map).

#### **Land and Resource Use**

LSJ includes a former borrow pit lake that was filled between 1970 and 1981. In 1971, the Site was first used as a landfill. During the following nine years, the lake was filled with mostly construction and demolition debris. It is suspected that industrial wastes, municipal wastes, and drummed wastes were also dumped at the Site. It is estimated that 80% of the wastes are located below the water table in the shallow Calumet aquifer.

The Site is currently not in use. The land itself is currently fenced; the contaminated sediments are contained within the fenced area under two-foot soil cover with a permanent vegetative cover of prairie grass (see Attachment 3 – Photographs Detailing Site Conditions). Current monitoring well sampling near the site show that high-level migration of contaminants in groundwater beyond the site boundary has not occurred. The Record of Decision (ROD) requires institutional controls (ICs) that would attempt to prevent future development of the land to protect against direct contact with, or further migration of, contaminants due to site excavation. The ROD also requires ICs that would prohibit installation of wells to prevent use of groundwater both onsite and in offsite areas.

The expansion of the I-80/94 on the southern boundary has increased automobile traffic. The area immediately surrounding the Site is not densely populated. However, there are moderately populated neighborhoods to the northeast within a ¼-mile of LSJ.

#### **History of Contamination**

LSJ was originally a sand and gravel borrow pit dug to support construction of the adjacent expressway in the 1960s. The exact dimensions of the pit are not known, but the maximum depth of the pit is thought to be 40 feet deep. The borrow pit gradually filled with groundwater and for a short time was used by the surrounding community as a recreational lake. In 1971, Robert Breski and Robert Nelson of the Gemin Corporation obtained rights to start filling the lake. Between 1971 and 1975 the lake was half filled and during these years there were numerous complaints about odors at the Site.

Legal proceedings were initiated by the State of Indiana in 1975 against the owners for operating without a permit, mismanagement of the landfill, and for contaminating and polluting the waters of the site. In 1976, the charges were sustained, the owners fined \$20,000 and ordered to pump the lake dry and restrict future fill to demolition debris only.

Instead, the Gemin Corporation sold LSJ to Glen and Gordon Martin. From 1976 to 1980, LSJ was known as the M&M Landfill. Although the landfill was never permitted, it was granted an

operating variance without a permit by the state. The operating variance restricted fill materials to wood, stone, concrete, brick and other similar types of demolition debris. Industrial wastes, municipal wastes, and garbage were not to be accepted. However, throughout M&M Landfill's operating period, the operating variance was revoked and reinstated several times for violations including inadequate site grading, failure to cover wastes, open dumping, and failure to meet the required fill and cover objectives within the allotted timeframe. Reports by the Gary Fire Department indicate a number of fires occurred on the landfill property that burned above and below ground. The Site has remained inactive since 1980.

### **Initial Response**

Operations at the Site ceased in 1980. LSJ has been under investigation by EPA since its discovery in December 1979. EPA became more involved at the Site in 1981 when it conducted a site investigation and developed a score under the Hazard Ranking System. The score qualified LSJ for listing on the National Priorities List (NPL). The Site was placed on the NPL on September 8, 1983. With no viable primary responsible parties, LSJ became a Fund-lead site. In 1986, immediate action was deemed necessary to prevent direct contact with surface soils. Emergency action was taken in April 1986 to erect a security fence around LSJ.

### **Basis for Taking Action**

A combined Remedial Investigation/Feasibility Study (RI/FS) conducted by CH2M Hill for EPA was completed in August 1986. The study revealed that the surface soils and sediments in the area were contaminated with polynuclear aromatic hydrocarbons (PAHs) and heavy metals. The sediment samples were collected from the drainage ditches south of the landfill. The study also revealed low-level contamination in the shallow groundwater around LSJ (see attachment 1: Extent of Contamination - Groundwater). High levels of iron, manganese, sodium, magnesium, potassium, low levels of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and heavy metals were detected in groundwater. Benzene was the only chemical detected that exceeded primary drinking water standards. No organic contaminants had been detected in residential wells but the potential existed for groundwater users to be exposed to undetected contaminants or increased levels of inorganic contaminants.

## **IV. Remedial Actions**

The ROD for LSJ was signed on September 26, 1986. The final remedy for the Site included on-site disposal of excavated sediments, a soil cover for the landfill, installation of a groundwater monitoring system, institutional controls (ICs) and an alternative water supply for surrounding and downgradient residents.

### **Remedy Implementation**

For remedial design (RD) and remedial action (RA), the project was divided into two operable units (OU). Soil cover construction, sediment excavation and onsite disposal, and monitoring well installation were completed in December 1990 as part of the RA for OU-1. The construction consisted of a 2-foot-thick soil cover over the landfill area. In order to maintain soil stability and erosion control, a permanent vegetative cover with prairie grass was established and maintained.

The OU-2 RA included provision of an alternate water supply to residents likely to be affected by groundwater contamination attributed to the Site. A total of 32 residences were connected to the water supply system. Eighteen residences chose not to be connected to the water supply system but were provided the equipment to make the connection. The OU-2 work was completed in September 1994.

#### Institutional Controls

ICs are non-engineered instruments, such as administrative and legal controls, that help to minimize the potential exposure to contamination, and protect the integrity of the remedy. ICs are required to assure long-term protectiveness for any areas which do not allow for UU/UE. ICs are also required to maintain the integrity of the remedy.

**Table 2: Description of Required Institutional Controls (as described in 1986 ROD)**

<b>Areas</b>	<b>Institutional Control Objective</b>
Landfill property (interpreted as the area occupied by the former landfill, not the current fenced boundary)	Would attempt to prevent future development of the land to protect against direct contact with contaminants or further migration of contaminants that would result from site excavation Prevent installation of wells into shallow aquifer
Residences provided municipal water	Prevent use of groundwater or installation of wells into shallow aquifer
Area north of landfill (not specified)	Prevent use of groundwater or installation of wells into shallow aquifer
Site perimeter (currently fenced boundary)	Control access to landfill property

A series of IC maps (paper and GIS versions) have been developed which depict areas subject to use restrictions. These maps overlay the parcel information with areas requiring land and groundwater use restrictions. These maps will be made available to the public on EPA's Superfund Data Management System (SDMS) and will serve as an additional IC as an informational control. (See Attachment 1 – Institutional Control (IC) Review Map)

The ROD described required ICs as placing deed restrictions to prevent future development of the land, prohibiting the use of groundwater or installation of shallow wells onsite, in the area provided municipal water and an area north of the Site, and restricting access to the Site by use of a fence.

The security fence was erected in 1986. On July 3, 2006, the City of Gary implemented a citywide groundwater ordinance. This ordinance prohibits the installation of wells for potable water and requires current potable-use well owners to connect to municipal water if available in their area. If not available, the owners are required to draw from a deeper confined aquifer. All potable-use wells have to be registered with the city. Wells for non-potable use are allowed and must also be registered in the city. As the ordinance does not deny installation of non-potable use

wells, some additional regulation must be put into place to ensure the properties affected by the OU-2 RA and the ROD are prohibited from any groundwater use.

As of 2001, the LSJ landfill site covered property owned by 14 different parties including the City of Gary. Three landowners, including the City of Gary, recorded restrictive covenants on their properties, in at least one case because of litigation by IDEM.

On August 21, 2001, IDEM received a default judgment against the 11 landowners who did not file restrictive covenants. The Court entered a declaratory judgment against the 11 landowners:

1. prohibiting residential use of the LSJ.
2. prohibiting the use of groundwater underlying the LSJ in any manner which would endanger human health or the environment.
3. prohibiting excavation, installation, construction, removal or use of any buildings, wells, pipes, roads, or ditches without written permission of EPA and IDEM.

The trial court further compelled each Defendant to execute and record a restrictive covenant which will prohibit activities which might expose humans to the hazardous substances still remaining beneath the LSJ within 60 days. If the landowner failed to record the required restrictions, IDEM was authorized to file the restrictions on behalf of the landowners. None of the landowners have filed the necessary restrictive covenants. IDEM did not file any restrictive covenants on behalf of the landowners because it was waiting for the results of a redevelopment study, discussed below, conducted by EPA.

In 2002, EPA funded a grant to assist the City of Gary with reuse planning at four NPL sites under the Superfund Redevelopment Initiative. LSJ was one of the sites chosen for a redevelopment study. Preliminary results concluded that LSJ had the greatest reuse potential of the four sites due to its location. The redevelopment study mentioned a few broad descriptions for recreational and commercial use. EPA and IDEM will evaluate whether these uses could be allowed in certain portions of the Site. Results of this evaluation will determine the restrictiveness of the required restrictive covenants.

An internal review of ICs was conducted at the Site in 2005. The review showed IC corrective measures needed to be taken. Therefore, an Institutional Controls Action Plan (ICAP) will be developed by March 31, 2007. EPA, in cooperation with IDEM, has conducted a title search on all parcels on the Site not belonging to the City of Gary. EPA has requested that the City of Gary provide title information for the parcels it owns. These actions are a necessary component of the ICAP.

### **System Operation and Maintenance**

The Indiana Department of Environmental Management (IDEM) began operation and maintenance (O&M) activities for OU-1 in February 1994 under the Revised Operation and Maintenance Manual dated August 1990. O&M activities included quarterly groundwater well sampling, cover maintenance and site security. For OU-2, a private utility company in the area, Gary Hobart Water Company (GHWC), agreed to assume ownership and provide O&M for the water supply lines constructed as part of the project.

Currently, IDEM conducts all O&M activities under the Final O&M Manual dated April 1996. The O&M manual prescribed quarterly sampling of the groundwater monitoring wells with the ability to change the frequency of the sampling as needed. IDEM evaluated 10 years of quarterly data conducted at LSJ. Based on the analysis, the sampling frequency was reduced from quarterly to semiannually in September 2004. With the stabilizing of benzene levels in the majority of the wells and the other contaminants remaining below action levels, the decrease in monitoring frequency was acceptable to EPA provided that wells of concern were sampled during each event. Monitoring wells of concern are located along the southeast perimeter of the site.

It was estimated during the FS that annual O&M costs would be approximately \$944,000. This value represented an order-of-magnitude level with an expected accuracy of +50/-30 percent. It was only presented in the O&M Manual as information. Present costs for LSJ O&M are shown below.

**Table 3: Annual System Operations/O&M Costs**

Dates		Total Cost rounded to nearest \$1,000
From	To	
January 2001	June 2006	\$136,000 – Personnel
January 2001	June 2006	\$122,000 – Contracts/Other Costs

## **V. Progress Since the Last Review**

This is the third five-year review for the Lake Sandy Jo Superfund Site. The second five-year review report was completed and signed in September 2001. Recommendations during the 2001 review included the following:

1. *IDEM staff will continue to monitor benzene levels in the groundwater which appear to be either decreasing or stabilizing.*

IDEM continues to monitor benzene levels in the groundwater. The primary wells of concern, located on LSJ's southeast perimeter are included in every sampling event. The benzene levels continue to decrease for MW-005 and MW-015 (see Attachment 1-Site Layout and Potentiometric Surface Map). Benzene levels in MW-006 are decreasing but remain significantly above the other wells of concern. Only MW-005 has seen benzene levels drop below the MCL of 5 parts per billion (ppb).

2. *After the next round of sampling, scheduled this fall 2001, tetrahydrofuran (THF) concentration will be further reviewed or a future course of action will be determined.*  
In 2004, THF showed up in one well as a tentatively identified compound (TIC). IDEM will continue to monitor for THF.

3. *IDEM will follow up and ensure that deed restrictions are recorded for the remaining properties at the site.*

EPA, in cooperation with IDEM, has conducted a title search on all the parcels that are on

the Site not owned by the City of Gary. EPA has requested that the City of Gary provide title information for the parcels it owns. Once the title search is completed, the deed restrictions will be put into place.

4. *The data collected during the teasel inspection survey will be analyzed and appropriate steps will be taken to contain teasel growth and spread at the site.*

Based on the survey conclusions, IDEM decided against using any chemicals to contain the teasel growth. Instead, IDEM increased the mowing frequency to 2-3 times a year, depending on weather conditions. IDEM will continue to monitor teasel growth on the site and take appropriate steps to contain the growth and spread if necessary.

## **VI. Five-Year Review Process**

### **Administrative Components**

The LSJ five-year review was prepared by Erica Islas, EPA RPM for the site. Prabhakar Kasarabada, IDEM Project Manager and Stephen Thorn, EPA Office of Regional Counsel assignee for LSJ, also assisted with the review. The five-year review consisted of a site inspection and a review of relevant documents.

### **Community Involvement**

Activities to involve the community in the five-year review process were initiated in 2006 between the EPA RPM and the IDEM Project Manager. An advertisement notice regarding the five-year review process was placed in the Gary Post Tribune on February 4, 2006, and invited the public to submit any comments to IDEM. No comments were received. The completed report will be made available at the site information repository.

### **Document Review**

Documents reviewed in preparation of this five-year review report include the following:

- Common Council of the City of Gary, Ordinance No. 7930 - Amended Ground Water Ordinance Restricting Usage, dated July 3, 2006
- Default Judgment, *Commissioner of IDEM vs. Beulah Berry, et al.*, Lake County Superior Court Cause No. 45D049904CP00293, dated August 21, 2001
- Operation & Maintenance Reports, dated November 2004, April 2005 and October 2005
- Five-Year Reports, dated January 1996 and September 2001
- Final Operation and Maintenance Manual, dated April 1996
- Final Record of Decision dated September 1986
- Final Remedial Investigation Report, dated August 1986

The remedial action objectives (RAOs) for LSJ are to ensure continued protection of human health and the environment near and downgradient of the Site. The ROD also identified the following general response actions necessary to address problems at LSJ.

- Prevention of inhalation, absorption or ingestion of surface soils and sediments.

- Prevention of ingestion of contaminated drinking water from existing and future releases to the Calumet aquifer.
- Prevention of future releases of sediments to east-west and southeast drainage ditches from on-site surface soil erosion.

The following standards were identified as applicable or relevant and appropriate requirements (ARARs) in the ROD or previous five-year reviews for LSJ, and were reviewed for changes that could affect protectiveness:

- Safe Drinking Water Act (SDWA), 40 CFR Parts 141 and 143. Part 141 establishes National Primary Drinking Water Standards. Maximum Contaminant Levels (MCLs) are applicable and non-zero MCL Goals (MCLGs) are to be considered. Part 143 establishes National Secondary Drinking Water Standards.
- Clean Water Act, 40 CFR Part 131. Water Quality Criteria for the discharge of contaminants to the drainage ditch.
- 327 Indiana Administrative Code (IAC) 2. State of Indiana Water Quality Standards water quality standards for the discharge of contaminants to the drainage ditch.
- 327 IAC 2-11. State of Indiana Ground Water Standards
- 327 IAC 8-2. State of Indiana Public Water Supply Drinking Water Standards
- Resource Conservation and Recovery Act of 1976 (RCRA).

## **Data Review**

The LSJ O&M plan has been completed and reported semiannually since the last five-year review. The exception to this occurred in 2004 when the Site was only sampled once in November. Groundwater monitoring wells are sampled and analyzed for VOCs during the semiannual program. Recent monitoring results have shown that VOC concentrations levels, with the exception of benzene, remain below action levels as prescribed in the O&M Manual.

Concentrations of benzene greater than MCLs continue to persist in the following perimeter wells: MW-005, MW-006, MW-015 and MW-023. However, it appears that the benzene levels are stabilizing. Results from upgradient well MW-021 and downgradient well MW-027 show that no migration of the contaminants of concern.

The contaminant levels of these wells will continue to be monitored on a semi-annual basis. Surface water sampling only occurred during the November 2004 sampling event. No contaminants of concern were detected from these samples. IDEM discontinued the metal analysis after the February 1999 sampling round.

## **Site Inspection**

The LSJ site inspection for this review was conducted on April 18, 2006. Erica Islas and Denise Boone of EPA and Prabhakar Kasarabada of IDEM were present during this inspection. The five-year review site inspection checklist was used as a guideline for the LSJ site inspection. The inspection was concurrent with the spring sampling event for the Site.



A walk was taken around the surface of the Site to observe the conditions at the site surface. A drive was also taken to observe those wells not located around the immediate site boundary and to note conditions of the surrounding neighborhood.

LSJ was found to be in good condition. No breaches to the landfill cap were observed and the cap remained predominantly vegetated. The access fence was properly in place with the gates locked. It was also noted that a construction and demolition debris area is located to the immediate east of the Site. The area houses MW-003, MW-004, MW-005 and MW-006.

Issues found during the five-year review inspection included:

1. MW-017 and MW-022, located on the south side of the interstate were not found. It is assumed that the wells were sheared to the ground during interstate expansion construction. This observation was also noted in the November 2004 O&M report.
2. The widening of the interstate has also undercut soils proximal to some of the wells located on the southern boundary of the site. Erosion has occurred resulting in the falling of sidewalls near MW-007 and MW-008 and near MW-009 and MW-010.
3. The presence of teasel and woody vegetation is still present on the site surface. The periodic mowing has been effective in containing growth and spread of teasel and woody vegetation on the surface.

## **VII. Technical Assessment**

The following questions address the protection of human health and the environment of the remedy at LSJ.

### **Question A: Is the remedy functioning as intended by the decision documents?**

**Answer:** Yes, except for ICs.

#### Remedial action performance

The remedial action selected in the ROD has been implemented and remains functional, operational and effective. With continued maintenance and monitoring of the soil cover and groundwater system, the remedy should contain the soil contamination and ensure that no migration of contaminants to groundwater will occur. The soil cover and site security fence ensure that source area contamination is contained and a permanent barrier exists to prevent human contact.

#### System Operations/O&M

O&M of the soil cover and drainage structure has been effective. Groundwater data has shown that contaminant concentrations continue to drop and natural attenuation may be effectively controlling contaminant concentration within the aquifer beneath the site and off-site. Current costs at LSJ are primarily attributable to operation, maintenance and management of the Site and groundwater monitoring systems.

When ICs are implemented, EPA will explore if modification of the O&M Manual will be necessary to include mechanisms to ensure routine inspections of ICs and routine certification to EPA that ICs are in place and effective. EPA will also explore whether development and inclusion of a communications plan to the O&M Manual is necessary to inform the community and local and state governments.

#### Opportunities for Optimization

There were no opportunities for system optimization observed during this review. The groundwater monitoring system provides sufficient data to assess the progress of natural attenuation within the plume and maintenance on the cap is sufficient to maintain its integrity.

#### Implementation of Institutional Controls and Other Measures

Since all ICs are not in-place, the remedy is not functioning as intended. As described earlier, an ICAP is required to assure affective ICs are implemented and monitored.

**Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?**

**Answer:** Yes.

#### Changes in Standards

Standards outlined in the 1986 ROD are still valid at LSJ. There have been no changes in remedial action objectives affecting the protectiveness of the remedy.

#### Changes in Toxicity and Other Contaminant Characteristics

Toxicity and other factors for contaminants of concern have not changed since the last five-year review in 2001.

#### Changes in Risk Assessment Methodologies

Risk assessment methodologies used at the LSJ Site since the last five-year review in 2001 have not changed and do not call into question the protectiveness of the remedy.

**Question C: Has any other information come to light that could call into question the protectiveness of the remedy?**

**Answer:** No.

No other information has become available that could question the remedy at LSJ. The site remedy remains protective of human health and the environment.

#### **Technical Assessment Summary**

The physical aspect of the remedy is functioning as intended by the ROD. However, the required ICs have not been put into place, affecting the overall protectiveness of the remedy in the long term. The standards, exposure pathways, toxicity factors for contaminants of concern, and risk assessment methodologies remain unchanged since the last five-year review. There is no other information that calls into question the protectiveness of the remedy.

## VIII. Issues

**Table 4: Issues**

Issues	Affects Protectiveness (Y/N)	
	Current	Future
In order for remedy to be protective in the long-term, effective ICs must be implemented and maintained	N	Y

### Issues Not Affecting Protectiveness of Remedy

Other issues at LSJ were noted but it was determined that they do not affect the protectiveness of the remedy in the long term. These issues include the following:

1. monitoring wells MW-017 and MW-022 were missing
2. fallen sidewalls at the southern perimeter wells
3. continued teasel growth on the site surface
4. benzene concentration levels remain above MCLs

## IX. Recommendations and Follow-up Actions

**Table 5: Recommendations and Follow-up Actions**

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N) Current, Future
In order for the remedy to be protective in the long-term, effective ICs must be implemented and maintained.	<p>Develop and implement an ICAP that will do the following:</p> <p>Evaluate and determine which restrictions are appropriate for each area of the Site</p> <p>Ensure that deed restrictions are recorded for remaining properties at the Site</p> <p>Request an additional groundwater</p>	IDEM / EPA	EPA / IDEM	<p>Development 3/31/2007</p> <p>Implementation Ongoing</p>	N, Y

	<p>ordinance to be put into place to restrict all groundwater use in both on-site and off-site areas affected by the remedial action and as designated by ROD</p> <p>Ensure effective procedures are in-place for long-term stewardship at the Site</p>				
--	---	--	--	--	--

### **Recommendations and Follow-Up Actions Not Affecting Protectiveness of Remedy**

For those issues noted but determined as not affecting the protectiveness of the remedy, the recommendations and follow-up actions include the following:

1. a check of whether missing wells were properly abandoned, replacement of wells or modification of O&M figures should be conducted as needed
2. replacement of fallen sidewalls on southern perimeter wells
3. continuance with semiannual mowing and reseeding the site surface, if necessary
4. continuance with semiannual monitoring of wells of concern

IDEM will be responsible for addressing those issues not affecting the protectiveness of the remedy before the beginning of the next five-year review of this site.

### **X. Protectiveness Statement**

The remedial actions for OU-1 and OU-2 are protective of human health and the environment in the short term. However, because the required ICs have not been implemented, the Site is not protective of human health and the environment in the long term. The ICs must do the following: 1) restrict land use such that it would not compromise the integrity of the remedy and allow for direct exposure to contaminants; and 2) prohibit the use of groundwater at those residences that were provided an alternative water supply under the remedial action and an area north of the Site.

### **XI. Next Review**

The next five-year review for the Lake Sandy Jo Site is required by September 2011, five years from the signature date of this review.

**Attachment 1**

**Site Maps**

**Site Location Map, Extent of Contamination Groundwater Map, Site Layout  
and Potentiometric Surface Map, Institutional Controls Review Map**

# Site Location

Superfund  
U.S. Environmental Protection Agency

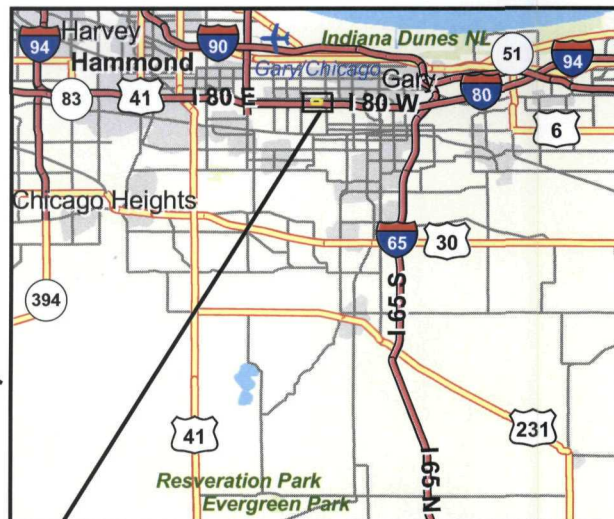


## Lake Sandy Jo (M&M Landfill) Lake County, IN

IND980500524



State



County



### Legend

Lake Sandy Jo Boundary

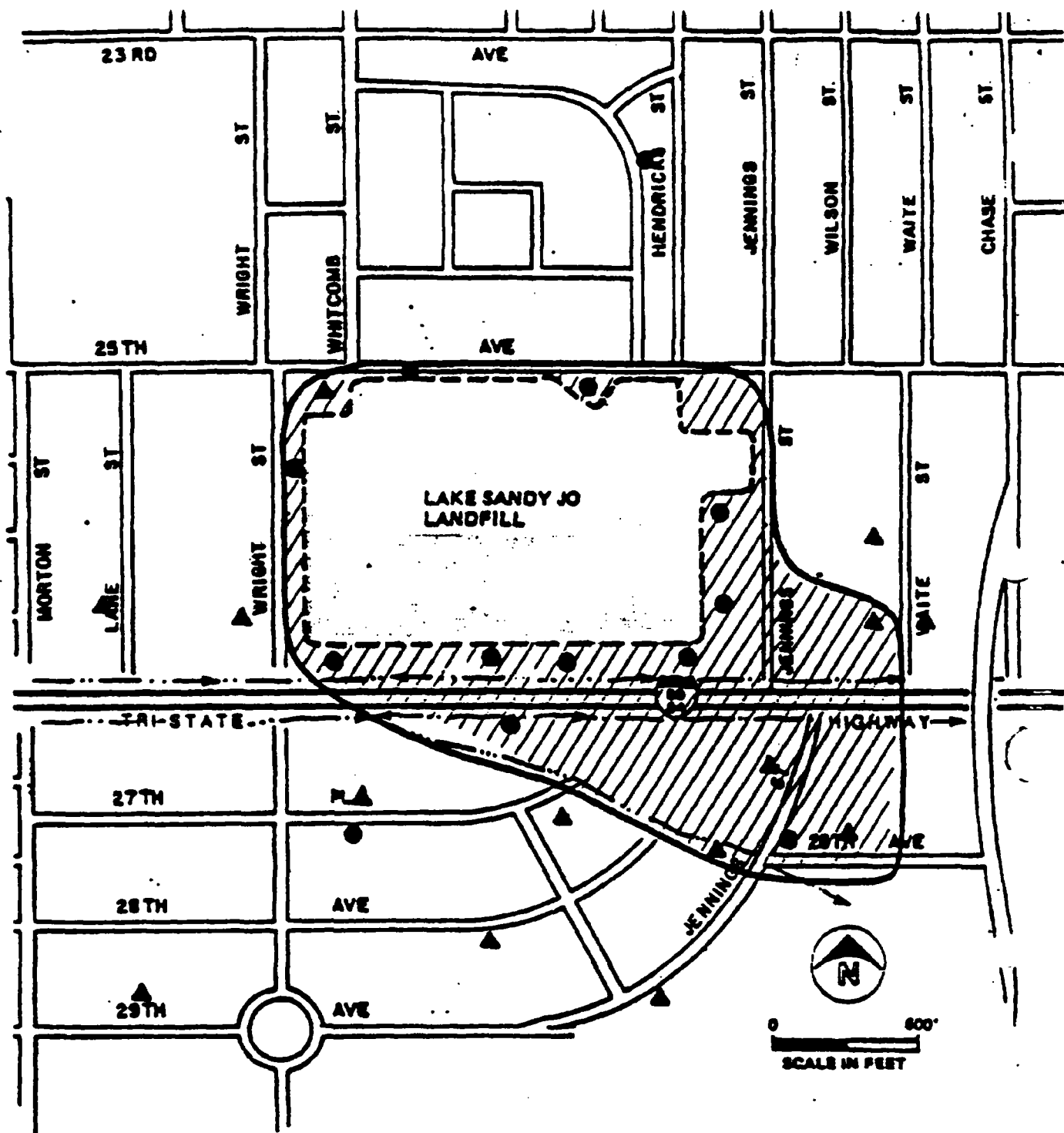
Created by Sarah Backhouse  
U.S. EPA Region 5 on 9/13/06  
Image Date: 2005



Site







#### LEGEND

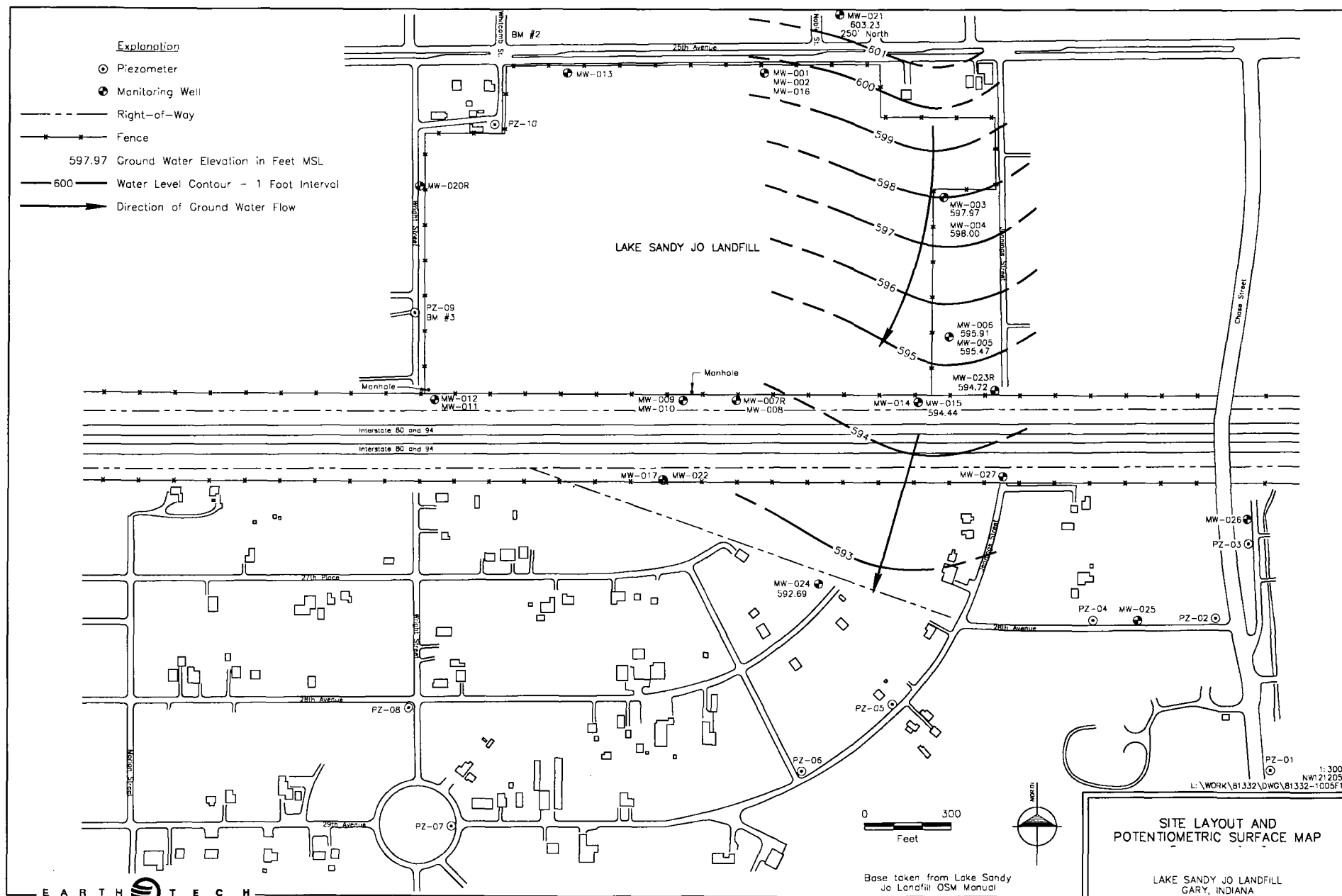
● APPROXIMATE LOCATION OF MONITORING WELL OR WELL PAIR IN CALUMET AQUIFER

▲ APPROXIMATE LOCATION OF SAMPLED RESIDENTIAL WELL IN CALUMET AQUIFER

--- APPROXIMATE LOCATION OF DRAINAGE DITCHES

////// AREA OF CALUMET AQUIFERS PRESENTLY AFFECTED BY CONTAMINANTS FROM LANDFILL. THE BOUNDARY ENCOMPASSES WELLS FROM WHICH SAMPLES WITH CONCENTRATIONS GREATER THAN BACKGROUND WERE OBTAINED.

EXTENT OF CONTAMINATIO  
GROUNDWATER





# Institutional Control (IC) Review

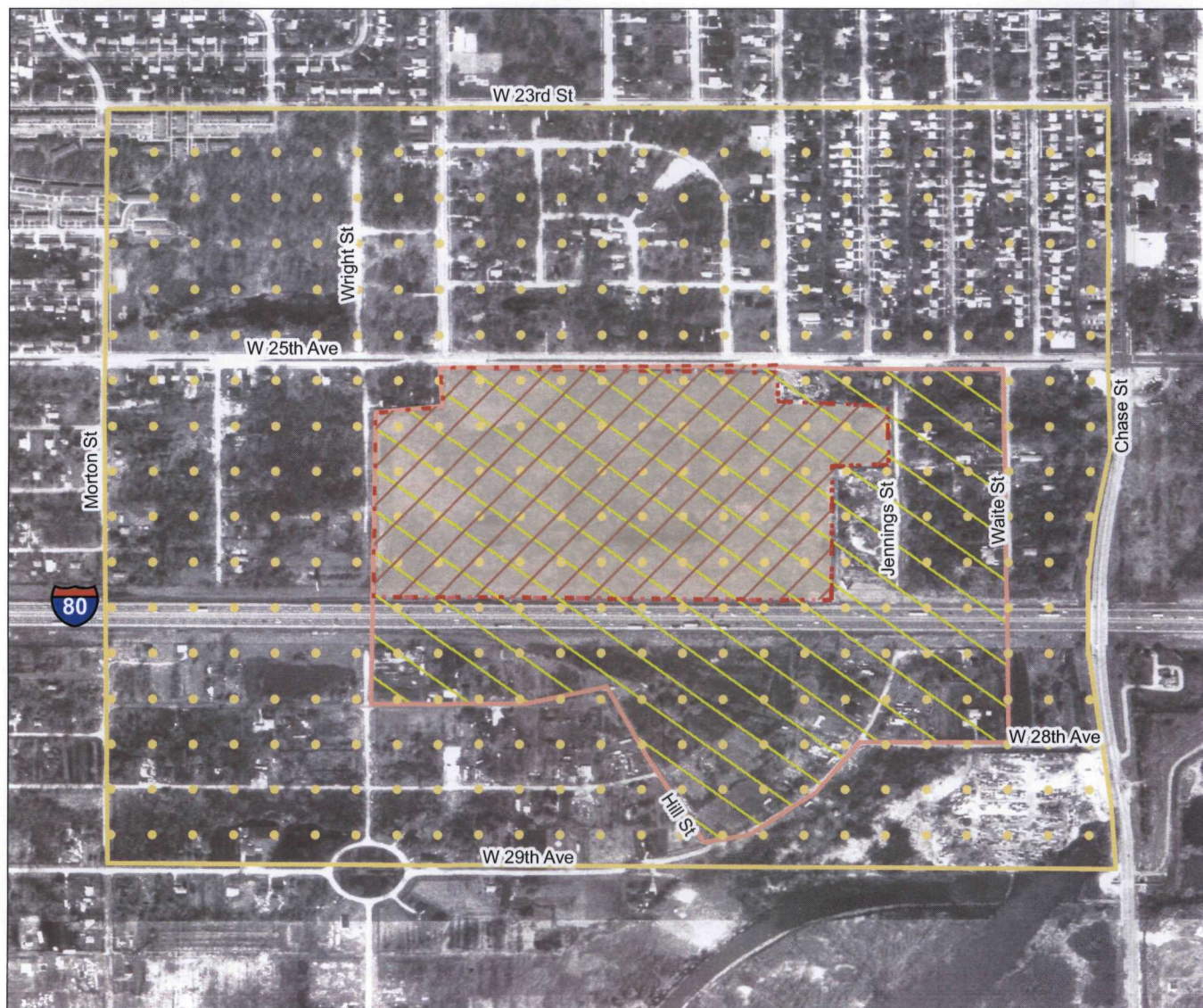
Areas Depicting Required  
Institutional Controls

Superfund  
U.S. Environmental Protection Agency



## Lake Sandy Jo (M&M Landfill) Lake County, IN

IND980500524



### Legend

- Site Boundary/Fence - Access Control
- Deed Restrictions - Required IC  
-Development and groundwater use prohibited
- Groundwater Area - Required IC  
-Exceeds clean up standard; alternative water supply provided
- Landfill Cap - Required IC  
-Disruption of cap prohibited
- Soil/Waste Area - Required IC  
-Industrial use only

0 400 800 Feet



EPA Disclaimer: Please be advised that areas depicted in the map have been estimated. The map does not create any rights enforceable by any party. EPA may refine or change this data and map at any time.

**GEOS**  
Groundwater Evaluation and Optimization System

Created by Sarah Backhouse  
U.S. EPA Region 5 on 3/15/2006

**Attachment 2**  
**Compilation of Monitoring Data**

TABLE 4  
SUMMARY OF VOCs RESULTS  
FEBRUARY 1994 TO  
OCTOBER 2005

OPERATION AND MAINTENANCE REPORT  
LAKE SANDY JO SUPERFUND SITE #7500077  
PAGE 1 OF 14

Sample Location Date IDEM No.	MCL	SF-01 11/04/04 LQ1871	SF-02 11/04/04 LQ1872	SF-03 11/04/04 LQ1873	MW-003 10/24/05 LQ2893	MW-003 04/14/05 LQ-2177	MW-003DUF 04/14/05 LQ-2179	MW-003 11/03/04 LQ1863	MW-003 Mar-03 LQ0153	MW-003 RI Phase I	MW-003 May-96 RO 2508	MW-003 May-97 RO 3224	MW-003 May-98 RO 4307	MW-003 Feb-99 RO 5305	MW-004 10/24/05 LQ2894	MW-004 04/14/05 LQ-2178	MW-004 11/03/04 LQ1864
<b>Volatile Organic Compounds (µg/l)</b>																	
1,1 dichloroethane	NA								-	NA	NA	NA	NA	NA			
1,1,1-trichloroethane	200	<1	<1	<1				<1	-	-	-	-	-	-			<1
1,2 dichloroethane	5	<1	<1	<1	<1			<1	-	NA	NA	NA	NA	NA	<1		<1
1,2-Dichloroethene	70				<1										<1		
1,2,4-Trimethylbenzene	NA								-	-	-	-	-	-			
2-butanone	NA								-	-	-	-	-	-			
2-hexanone	NA								-	-	-	-	-	-			
Acetone	NA								-	36	-	-	-	-			
Acrolein	NA								-	-	-	-	-	-			
Acrylonitrile	NA								-	-	-	-	-	-			
Benzene	5	<1	<1	<1	<1	<1	<1	<1	-	-	-	11	-	-	<1	<1	<1
Bromoforn	80								-	-	-	-	-	-			
Carbon Disulfide	NA								-	-	-	-	-	-			
Chlorobenzene	NA	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	<1	<1	<1
Chloroethane	NA	<2	<2	<2	<2	<2	<2	<2	-	-	-	-	-	-	<2	<2	<2
Chloroform	80								-	-	-	-	-	-			
Ethylbenzene	700	<1	<1	<1		<1	<1	<1	-	-	-	-	-	-		<1	<1
Isopropylbenzene	NA	<1	<1	<1	<1			<1	-	-	-	-	-	-			<1
m/p xylene	10000				<1				-	NA	NA	NA	NA	NA			
Methylene Chloride	5				<1				-	4 B	-	7.5J	-	-	<1		
methyl-T-butyl ether	40				<1				-	NA	NA	NA	NA	NA			
Tetrachlorofluoromethane	NA				<1				-	-	-	-	-	-	<1		
Tetrahydrofuran	NA				<1				-	-	-	-	-	-	<1		
Toluene	1000	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-		<1	<1
Trichloroethene	NA				<1				-	-	-	-	-	-	<1		
Total xylene(s)	10000	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	<1	<1	<1
Vinyl Acetate	NA								-	-	-	-	-	-			
Vinyl Chloride	2								-	-	-	-	-	-			
Unknowns	NA								-	-	-	-	-	5.5			
Total of TICs		7.0	2.2		8.1			7.8									

Table is based on data provided by IDEM

**Bold concentrations exceed screening criterion**

"-"= Analyte below detection limit

NA = not applicable, not available, or not analyzed as appropriate

J = Concentrations estimated due to q/c qualifier

R = Spike Sample recovery not within control limits - value not used in screening evaluation

UJ = Concentrations are below detection limit and estimated due to quality control qualifier

B = Blank contaminated

MCL = Maximum Contaminant Level as directed by U.S. E.P.A. Drinking Water Regulations, February, 1996

TABLE 4  
SUMMARY OF VOCs RESULTS  
FEBRUARY 1994 TO  
OCTOBER 2005

OPERATION AND MAINTENANCE REPORT  
LAKE SANDY JO SUPERFUND SITE #7500077  
PAGE 2 OF 14

Sample Location Date IDEM No.	MW-004 RI Phase I	MW-004 May-98 RO4328	MW-004 Feb-99	MW-005 10/25/05 LQ2896	MW-005 04/14/05 LQ-2180	MW-005 11/03/04 LQ1865	MW-005 Sep-03 LQ0761	MW-005DUP Sep-03 LQ0762	MW-005 Jun-03 LQ0472	MW-005DUP Jun-03 LQ0473	MW-005 Dec-02 TK7149	MW-005* Dec-02 TK7151	MW-005 Aug-02 RO9705	MW-005* Aug-02 RO9706	MW-005 RI Phase I
<b>Volatile Organic Compounds (µg/l)</b>															
1,1 dichloroethane	NA	NA	NA				-	-	-	-	NA	NA	-	-	NA
1,1,1-trichloroethane	-	-	-			<1	-	-	-	-	NA	NA	-	-	-
1,2 dichloroethane	NA	NA	NA	<1		<1	-	-	-	-	-	-	-	-	NA
1,2-Dichloroethene				<1											
1,2,4-Trimethylbenzene			-				-	-	-	-	NA	NA	NA	NA	
2-butanone	-	-	-				-	-	-	-	NA	NA	NA	NA	8
2-hexanone	-	-	-				-	-	-	-	NA	NA	NA	NA	-
Acetone	18	-	-				-	-	-	-	NA	NA	NA	NA	35
Acrolein	-	-	-				-	-	-	-	NA	NA	NA	NA	-
Acrylonitrile	-	-	-				-	-	-	-	NA	NA	NA	NA	-
Benzene	-	11	14	4.2	1.9	16	32	33	38	23	13	13	23.0	20	24
Bromoform	-	-	-				-	-	-	-	NA	NA	NA	NA	-
Carbon Disulfide	-	-	-				-	-	-	-	NA	NA	NA	NA	-
Chlorobenzene			-	1.1	<1	1.4	-	-	-	-	-	-	NA	NA	-
Chloroethane	-	-	-	4.1	<2	5.1	-	-	21	-	4.8	5.6	-	-	-
Chloroform	-	-	-				-	-	-	-	NA	NA	NA	NA	-
Ethylbenzene	-	-	-		<1	<1	-	-	-	-	NA	NA	NA	NA	-
Isopropylbenzene	-	-	-	2.5		1.4	-	-	-	-	2	2	NA	NA	-
m/p xylene	NA	NA	NA				-	-	-	-	NA	NA	-	-	NA
Methylene Chloride	3 B	-	-				-	-	-	-	NA	NA	23	5.9	29 B
methyl-T-butyl ether	NA	NA	NA				-	-	-	-	NA	NA	-	-	NA
Tetrachlorofluoromethane	-	-	5.1N				-	-	-	-	NA	NA	NA	NA	-
Tetrahydrofuran	-	-	-				-	-	-	-	NA	NA	NA	NA	-
Toluene	-	-	-	<1	<1	<1	-	-	-	-	-	-	NA	NA	-
Trichloroethene	-	-	-	<1			-	-	-	-	NA	NA	NA	NA	-
Total xylene(s)	-	-	-	2.7	<1	2.5	-	-	-	-	1.5	1.5	NA	NA	-
Vinyl Acetate	-	-	-				-	-	-	-	NA	NA	NA	NA	-
Vinyl Chloride	-	-	-				-	-	-	-	-	-	-	-	-
Unknowns	-	-	-				-	-	-	-	-	-	NA	NA	-
Total of TICs				24.6		50.7									

Table is based on data provided by IDEM

**Bold concentrations exceed screening criterion**

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NA = not applicable, not available, or not analyzed as appropriate

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R = Spike Sample recovery not within control limits - value not used in screening evaluation

UJ = Concentrations are below detection limit and estimated due to quality control qualifier

B = Blank contaminated

MCL = Maximum Contaminant Level

TABLE 4  
SUMMARY OF VOCs RESULTS  
FEBRUARY 1994 TO  
OCTOBER 2005

OPERATION AND MAINTENANCE REPORT  
LAKE SANDY JO SUPERFUND SITE #7500077  
PAGE 3 OF 14

Sample Location Date IDEM No.	MW-005 May-96 RO 2509	MW-005 Aug-96 RO 2731	MW-005 Dec-96 RO2882	MW-005 Feb-97 RO2976	MW-005 Feb-97 RO2977	MW-005 Feb-97 RO3225	MW-005 dup Feb-97 RO3226	MW-005 Aug-97 RO3580	MW-005 dup Aug-97 RO3581	MW-005 Dec-97 RO3806	MW-005 dup Dec-97 RO3817	MW-005 Feb-98 RO4101	MW-005 dup Feb-98 RO3817	MW-005 May-98 RO4308
<b>Volatile Organic Compounds (µg/l)</b>														
1,1 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	-	-	-	-	NA	-	-	-	-	-	-	-	-	-
1,2 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-butanone	-	-	-	NA	NA	-	-	-	-	-	-	-	-	-
2-hexanone	-	-	-	NA	NA	-	-	-	-	-	-	-	-	-
Acetone	29	-	-	-	-	-	-	-	-	-	-	-	-	23
Acrolein	-	-	-	NA	NA	-	-	-	-	-	-	-	-	-
Acrylonitrile	-	-	-	NA	NA	-	-	-	-	-	-	-	-	-
Benzene	<b>36</b>	<b>37</b>	<b>44</b>	<b>43</b>	<b>43</b>	<b>52</b>	<b>51</b>	<b>50</b>	<b>54</b>	<b>26</b>	<b>25</b>	<b>41</b>	<b>45</b>	<b>35</b>
Bromoform	-	-	-	NA	NA	-	-	-	-	-	-	-	-	-
Carbon Disulfide	-	-	-	NA	NA	-	-	-	-	-	-	-	-	-
Chlorobenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	-	6 J	-	NA	NA	12	13	-	-	12	11	12	15	-
Chloroform	-	-	-	NA	NA	-	-	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	NA	NA	-	-	7	-	-	-	-	-	-
Isopropylbenzene	-	-	-	-	NA	-	-	-	-	-	-	2.2	2.5	-
m/p xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	-	6	7	NA	NA	<b>9.9J</b>	<b>12J</b>	-	-	-	-	-	-	-
methyl-T-butyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorofluoromethane	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrahydrofuran	160	92	170	180	190	-	-	-	-	-	-	-	-	140
Toluene	-	-	-	NA	NA	-	-	-	-	-	-	1	1.1	-
Trichloroethene	-	16	-	NA	NA	-	-	-	-	-	-	-	-	-
Total xylene(s)	6	7	-	NA	NA	-	-	-	5J (m)	-	-	4.4	4.7	6
Vinyl Acetate	-	-	-	NA	NA	-	-	-	-	-	-	-	-	-
Vinyl Chloride	-	-	-	NA	NA	-	-	-	-	-	-	-	-	-
Unknowns	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total of TICs														

Table is based on data provided by IDEM

**Bold concentrations exceed screening criterion**

"-"= Analyte below detection limit

NA= not applicable, not available, or not analyzed as appropriate

J = Concentrations estimated due to q/c qualifier

R = Spike Sample recovery not within control limits - value not used in screening evaluation

UJ = Concentrations are below detection limit and estimated due to quality control qualifier

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MCL = Maximum Contaminant Level

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FEBRUARY 1994 TO  
OCTOBER 2005

OPERATION AND MAINTENANCE REPORT  
LAKE SANDY JO SUPERFUND SITE #7500077  
PAGE 4 OF 14

Sample Location Date IDEM No.	MW-005dup May-98 RO4320	MW-005 Aug-98 RO4570	MW-005 Dec-98 RO4837	MW-005dup Dec-98 RO4843	MW-005 Feb-99 RO5309	MW-006 10/25/05 LQ2896	MW-006 04/14/05 LQ-2181	MW-006 11/03/04 LQ1866	MW-006DUF 11/03/04 LQ1867	MW-006 Sep-03 LQ0766	MW-006 Dec-02 TK7150	MW-006 Aug-02 RO9707	MW-006 RI Phase I	MW-006 Feb-94 RK 8820	MW-006 Aug-96 RO 2732	MW-006 Aug-96 RO 2734	MW-006 Aug-97 RO3577
<b>Volatile Organic Compounds (µg/l)</b>																	
1,1 dichloroethane	NA	NA	NA	NA	NA					-	NA	-	NA	NA	NA	NA	NA
1,1,1-trichloroethane	-	28	-	-	-			<1	<1	-	NA	-	-	-	-	-	-
1,2 dichloroethane	NA	NA	NA	NA	NA	21		<1	<1	-	3.1	-	NA	NA	NA	NA	NA
1,2-Dichloroethene						<1											
1,2,4-Trimethylbenzene	-	1.9 N	-	-	-					-	NA	NA	-	-	-	-	-
2-butanone	-	-	-	-	-					-	NA	NA	-	-	-	-	-
2-hexanone	-	-	-	-	-					-	NA	NA	-	-	-	-	-
Acetone	-	-	-	-	-					-	NA	NA	68	-	-	-	-
Acrolein	-	-	-	-	-					-	NA	NA	-	-	-	-	-
Acrylonitrile	-	-	-	-	-					-	NA	NA	-	-	-	-	-
Benzene	33	29	21	21	33	89	100	88	96	82	160	100.0	14	59 J	84	81	110
Bromoform	-	-	-	-	-					-	NA	NA	-	-	-	-	-
Carbon Disulfide	-	-	-	-	-					-	NA	NA	-	-	-	-	-
Chlorobenzene	-	1.1 N	-	-	-	1.7	1.6	1.4	1.3	-	1.1	NA	-	-	-	-	-
Chloroethane	-	5.6	8	7.6	14	5.4	7.1	5.5	6.7	-	11	6.30	8	11	6 J	9 J	8
Chloroform	-	-	-	-	-					-	NA	NA	-	-	-	-	-
Ethylbenzene	-	-	-	-	-		8.7	<1	<1	-	NA	NA	-	-	-	-	-
Isopropylbenzene	-	3.6	-	-	-	1.2		1.2	<1	-	-	NA	-	-	-	-	-
m/p xylene	NA	NA	NA	NA	NA					-	NA	-	NA	NA	NA	NA	NA
Methylene Chloride	-	-	-	-	-					-	NA	6.3	29 B	-	-	5	-
methyl-T-butyl ether	NA	NA	NA	NA	NA					-	NA	-	NA	NA	NA	NA	NA
Tetrachlorofluoromethane	-	-	-	-	-					-	NA	NA	-	-	-	-	-
Tetrahydrofuran	150	85	-	-	68					-	NA	NA	-	-	120	120	-
Toluene	-	-	-	-	-	2.8	3.1	2.2	2.7	-	3.1	NA	-	1.7	-	-	-
Trichloroethene	-	-	-	-	-	<1				-	NA	NA	-	-	13	16	-
Total xylenes(s)	6	5.8	5.2	6.8	-	12	11	9.6	8.8	-	6.6	NA	-	2.2	6	6	-
Vinyl Acetate	-	-	-	-	-					-	NA	NA	-	-	-	-	-
Vinyl Chloride	-	-	-	-	-					-	-	-	-	-	-	-	-
Unknowns	-	-	-	-	-					-	-	NA	-	-	-	-	-
Total of TICs						87.7		163.2	162.2								

Table is based on data provided by IDEM

**Bold concentrations exceed screening criterion**

"-"= Analyte below detection limit

NA = not applicable, not available, or not analyzed as appropriate

J = Concentrations estimated due to q/c qualifier

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MCL = Maximum Contaminant Level



TABLE 4  
SUMMARY OF VOCs RESULTS  
FEBRUARY 1994 TO  
OCTOBER 2005

OPERATION AND MAINTENANCE REPORT  
LAKE SANDY JO SUPERFUND SITE #7500077  
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Sample Location Date IDEM No.	MW-006 Dec-97 RO3818	MW-006 Feb-98 RO4106	MW-006 May-98 RO4321	MW-006 Aug-98 RO4572	MW-006 Feb-99 RO5311	MW-007R Sep-03 LQ0768	MW-007R Jun-03 LQ0475	MW-007 RI Phase I	MW-007R Dec-02 TK7146	MW-007R May-95 RO 1564	MW-007R May-95 RO 1566	MW-007R Nov-95 RO 2086	MW-007B May-96 RO 2510	MW-007B May-96 RO 2511	MW-007R Aug-96 RO 2735	MW-007R Dec-96 RO2881	MW-007R Dec-96 RO2886
<b>Volatile Organic Compounds (µg/l)</b>																	
1,1 dichloroethane	NA	NA	NA	NA	NA	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	-	-	-	20	-	-	-	-	NA	-	-	-	-	-	-	-	-
1,2 dichloroethane	NA	NA	NA	NA	NA	-	-	NA	-	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	-	-	-	1.8 N	-	-	-	-	NA	-	-	-	-	-	-	-	-
2-butanone	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
2-hexanone	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Acetone	-	-	24	-	-	-	-	102	NA	-	-	-	-	-	-	-	-
Acrolein	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Acrylonitrile	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Benzene	100	99	81	99	98	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Carbon Disulfide	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Chlorobenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	17	15	-	11	14	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Isopropylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
m/p xylene	NA	NA	NA	NA	NA	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	-	-	-	-	-	-	-	31 B	NA	-	-	-	-	-	-	9	9
methyl-T-butyl ether	NA	NA	NA	NA	NA	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorofluoromethane	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Tetrahydrofuran	-	-	170	100	94	-	-	-	NA	-	-	-	-	-	-	-	-
Toluene	-	2.2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Total xylene(s)	-	5.3	5	6.8	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Acetate	-	-	-	-	-	-	-	-	NA	-	-	-	-	-	-	-	-
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknowns	-	-	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-
Total of TICs																	

Table is based on data provided by IDEM

**Bold concentrations exceed screening criterion**

"-" = Analyte below detection limit

NA = not applicable, not available, or not analyzed as appropriate

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FEBRUARY 1994 TO  
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Sample Location Date IDEM No.	MW-007R Dec-96 RO2886	MW-007R Feb-97 RO2975	MW-007R May-97 RO3227	MW-007R Aug-97 RO3585	MW-007R Dec-97 RO3819	MW-007R Feb-98 RO4102	MW-007R May-98 RO4322	MW-007R Aug-98 RO4575	MW-007R Dec-98 RO4575	MW-007R Feb-99 RO5304	MW-011 Mar-03 LQ0152	MW-014 11/04/04 LQ1869	MW-014 Dec-02 TK7148	MW-014 Aug-02 RO9702	MW-014 RI Phase I	MW-014 dup RI Phase I	MW-014 Feb-94 RK 8808
<b>Volatile Organic Compounds (µg/l)</b>																	
1,1 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	NA	-	-	-	-
1,1,1-trichloroethane	-	-	-	-	-	-	-	-	-	-	-	<1	NA	-	NA	NA	NA
1,2 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	<1	1.2	-	NA	NA	NA
1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
1,2,4-Trimethylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
2-butanone	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
2-hexanone	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Acetone	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	14	-	-
Acrolein	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Acrylonitrile	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Benzene	-	-	-	-	-	-	-	-	-	-	-	26	48	38.0	5	5	20
Bromoform	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Carbon Disulfide	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Chlorobenzene	-	-	-	-	-	-	-	-	-	-	-	12	-	NA	-	-	-
Chloroethane	-	-	-	-	-	-	-	-	-	-	-	<2	13	10	-	-	5.7
Chloroform	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-	<1	NA	NA	-	-	-
Isopropylbenzene	-	-	-	-	-	-	-	-	-	-	-	<1	-	NA	-	-	-
m/p xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	NA	-	NA	NA	NA
Methylene Chloride	9	-	10J	6	-	-	-	-	-	-	-	-	NA	8.8	2 B	-	-
methyl-T-butyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	NA	-	NA	NA	NA
Tetrachlorofluoromethane	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	NA	NA	NA
Tetrahydrofuran	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Toluene	-	-	-	-	-	-	-	-	-	-	-	<1	-	NA	-	-	-
Trichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Total xylene(s)	-	-	-	-	-	-	-	-	-	-	-	<1	-	NA	-	-	-
Vinyl Acetate	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknowns	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	NA	NA
Total of TICs												159.3					

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Sample Location Date IDEM No.	MW-014 Feb-94 RK 8813	MW-014 Aug-94 RK 9689	MW-014 Feb-95 RO 1314	MW-014 Aug-95 RO 1917	MW-014 Aug-95 RO 1918	MW-014 Nov-95 RO 2087	MW-015 10/24/05 LQ2182	MW-015dup 10/24/05 LQ2852	MW-015 04/14/05 LQ-2182	MW-015 11/04/04 LQ1870	MW-015 Sep-03 LQ0767	MW-015 Jun-03 LQ0476	MW-015 Dec-02 TK7147	MW-015 Aug-02 RO9701	MW-015 RI Phase I	MW-015 Feb-94 RK8809	MW-015 Aug-94 RK9690
<b>Volatile Organic Compounds (µg/l)</b>																	
1,1 dichloroethane	-	-	-	-	-	-	-	-	-	-	-	-	NA	-	NA	NA	NA
1,1,1-trichloroethane	NA	NA	NA	NA	NA	NA	-	-	-	<1	-	-	NA	-	-	-	-
1,2 dichloroethane	NA	NA	NA	NA	NA	NA	<1	<1	-	<1	-	-	-	-	NA	NA	NA
1,2-Dichloroethene	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
2-butanone	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
2-hexanone	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	2 B	-	-
Acetone	-	29	-	-	-	26	-	-	-	-	-	-	NA	NA	-	-	26
Acrolein	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Acrylonitrile	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Benzene	12	6	16	13	12	26	14	13	11	19	25	24	32	28.0	3	12	24
Bromoform	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Carbon Disulfide	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Chlorobenzene	-	-	-	-	-	-	<1	<1	<1	17	-	-	-	NA	-	-	-
Chloroethane	7.6	-	-	9	9	-	7.6	7.3	13	<2	-	-	13	11	-	6.4	9 J
Chloroform	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	<1	<1	-	-	NA	NA	-	-	-
Isopropylbenzene	-	-	-	-	-	-	<1	<1	-	<1	-	-	-	NA	-	-	-
m/p xylene	NA	NA	NA	NA	NA	NA	<1	<1	-	-	-	-	NA	-	NA	NA	NA
Methylene Chloride	-	-	-	-	-	-	<1	<1	-	-	-	-	NA	10	-	-	-
methyl-T-butyl ether	NA	NA	NA	NA	NA	NA	<1	<1	-	-	-	-	NA	-	NA	NA	NA
Tetrachlorofluoromethane	NA	NA	NA	NA	NA	NA	<1	<1	-	-	-	-	NA	NA	-	-	-
Tetrahydrofuran	-	450	4100	82J	97J	470	<1	<1	-	-	-	-	NA	NA	-	-	380
Toluene	-	-	-	-	-	-	<1	<1	<1	<1	-	-	-	NA	-	-	-
Trichloroethene	-	-	-	-	-	-	<1	<1	-	-	-	-	NA	NA	-	-	-
Total xylene(s)	-	-	-	-	-	-	<1	<1	<1	<1	-	-	-	NA	-	-	-
Vinyl Acetate	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknowns	NA	NA	NA	NA	NA	NA	-	-	-	-	-	-	-	NA	-	-	-
Total of TICs							30.6	29.2		129.3							

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FEBRUARY 1994 TO  
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LAKE SANDY JO SUPERFUND SITE #7500077  
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Sample Location Date IDEM No.	MW-015 Nov-94 RO 1045	MW-015 Feb-95 RO 1316	MW-015 Feb-95 RO 1317	MW-015 May-95 RO 1568	MW-015 Aug-95 RO1920	MW-015 Nov-95 RO 2092	MW-015 Nov-95 RO 2093	MW-015 May-96 RO 2513	MW-015 Aug-96 RO 2736	MW-015 Dec-96 RO2883	MW-015 Feb-97 RO2979	MW-015 May-97 RO3229	MW-015 Aug-97 RO3581	MW-015 Dec-97 RO3815	MW-015 Feb-98 RO4103	MW-015 May-98 RO4318	MW-015 Aug-98 RO4577
<b>Volatile Organic Compounds (µg/l)</b>																	
1,1 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	26
1,2 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3 N
2-butanone	NA	NA	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-
2-hexanone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	-	22	-	-	-	50	44	-	-	-	-	-	-	-	-	-	-
Acrolein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acrylonitrile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	24	18	19	24	-	26	26	17	27	28	26	29	36	25	27	26	33
Bromoform	-	-	-	5 UJ	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon Disulfide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	-	-	-	-	-	10	12	-	-	-	-	9	8	14	13	12	13
Chloroform	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
m/p xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	-	-	-	-	-	-	-	-	-	7	-	8J	-	-	-	-	-
methyl-T-butyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorofluoromethane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrahydrofuran	400	3400	2300	430	44J	310	260	360	160	300	390	-	-	-	-	270	133
Toluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total xylene(s)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Acetate	-	-	-	10 UR	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknowns	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total of TICs																	

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FEBRUARY 1994 TO  
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OPERATION AND MAINTENANCE REPORT  
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Sample Location Date IDEM No.	MW-015 Dec-98 RO4841	MW-015 Feb-99 RO5303	MW-015dup Feb-99 RO5310	MW-016 Sep-02 RO9721	MW-017 Mar-03 LQ0159	MW-020R 11/03/04 LQ1862	MW-020R Aug-02 RO9711	MW-021 10/24/05 LQ2888	MW-021 04/14/05 LQ-2175	MW-021 11/03/04 LQ1860	MW-021 Sep-03 LQ0760	MW-021 Jun-03 LQ0471	MW-021 Feb-95 RK 1312	MW-021 May-95 RO 1562	MW-021 Nov-95 RO 2088	MW-021 May-96 RO 2507	MW-021 Aug-96 RO 2727
<b>Volatile Organic Compounds (µg/l)</b>																	
1,1 dichloroethane	NA	NA	NA	-	-	-	0.79				-	-	NA	NA	NA	NA	NA
1,1,1-trichloroethane	-	-	-	-	-	2.3	2.8			<1	-	-	-	-	-	-	-
1,2 dichloroethane	NA	NA	NA	0.54	-	<1	-	<1		<1	-	-	NA	NA	NA	NA	NA
1,2-Dichloroethene								<1									
1,2,4-Trimethylbenzene	-	-	-	NA	-		NA				-	-	-	-	-	-	-
2-butanone	-	-	-	NA	-		NA				-	-	-	-	-	-	-
2-hexanone	-	-	-	NA	-		NA				-	-	-	-	-	-	-
Acetone	-	-	-	NA	-		NA				-	-	31	-	-	-	-
Acrolein	-	-	-	NA	-		NA				-	-	-	-	-	-	-
Acrylonitrile	-	-	-	NA	-		NA				-	-	-	-	-	-	-
Benzene	32	27	27	-	-	<1	-	<1	<1	<1	-	-	-	-	-	-	-
Bromoform	-	-	-	NA	-		NA				-	-	-	5 UJ	-	-	-
Carbon Disulfide	-	-	-	NA	-		NA				-	-	-	32	-	-	-
Chlorobenzene	-	-	-	NA	-	<1	NA	<1	<1	<1	-	-	-	-	-	-	-
Chloroethane	14	16	17	-	-	<2	-	<2	<2	<2	-	-	-	-	-	-	-
Chloroform	-	-	-	NA	-		NA				-	-	-	-	-	-	-
Ethylbenzene	-	-	-	NA	-	<1	NA	<1	<1	<1	-	-	-	-	-	-	-
Isopropylbenzene	-	-	-	NA	-	<1	NA	<1	<1	<1	-	-	-	-	-	-	-
m/p xylene	NA	NA	NA	0.084	-		-				-	-	NA	NA	NA	NA	NA
Methylene Chloride	-	-	-	1.8	-		0.83				-	-	-	-	-	-	-
methyl-T-butyl ether	NA	NA	NA	-	-		-				-	-	NA	NA	NA	NA	NA
Tetrachlorofluoromethane	-	-	-	NA	-		NA				-	-	-	-	-	-	-
Tetrahydrofuran	-	160	150	NA	-		NA				-	-	-	-	-	-	-
Toluene	-	-	-	NA	-	<1	NA	<1	<1	<1	-	-	-	-	-	-	-
Trichloroethene	-	-	-	NA	-		NA	1.3			-	-	-	-	-	-	-
Total xylene(s)	-	-	-	NA	-	<1	NA	<1	<1	<1	-	-	-	-	-	-	-
Vinyl Acetate	-	-	-	NA	-		NA				-	-	-	-	-	-	-
Vinyl Chloride	-	-	-	-	-		-				-	-	-	-	-	-	-
Unknowns	-	-	-	NA	-		NA				-	-	-	-	-	-	-
Total of TICs																	

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LAKE SANDY JO SUPERFUND SITE #7500077  
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Sample Location Date IDEM No.	MW-021 Dec-96 RO2880	MW-021 Feb-97 RO2974	MW-021 May-97 RO3231	MW-021 Aug-97 RO3576	MW-021 Dec-97 RO3812	MW-021 Feb-98 RO4100	MW-021 May-98 RO4315	MW-021dup May-98 RO4325	MW-021 Aug-98 RO4574	MW-021 Dec-98 RO4840	MW-021 Feb-99 RO5313	MW-022 Dec-02 TK7155	MW-022 Sep-02 RO9723	MW-022 Feb-94 RK8818	MW-022 Nov-95 RO2091	MW-023R 10/24/05 LQ2489	MW-023R 04/14/05 LQ-2176
<b>Volatile Organic Compounds (ug/l)</b>																	
1,1 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA		
1,1,1-trichloroethane	-	-	-	-	-	-	-	-	-	-	-	NA	-	-	-		
1,2 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	NA	NA		
1,2-Dichloroethene																8.6	
1,2,4-Trimethylbenzene	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
2-butanone	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
2-hexanone	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Acetone	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	25		
Acrolein	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Acrylonitrile	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Benzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.8	3.3
Bromoform	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Carbon Disulfide	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Chlorobenzene	-	-	-	-	-	-	-	-	-	-	-	-	NA	-	-		
Chloroethane	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-		
Chloroform	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Isopropylbenzene	-	-	-	-	-	-	-	-	-	-	-	-	NA	-	-		
m/p xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA		
Methylene Chloride	-	-	6J	-	-	-	-	-	-	-	-	NA	0.54	-	-		
methyl-T-butyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA		
Tetrachlorofluoromethane	-	-	-	-	-	-	-	-	-	-	-	NA	NA	NA	NA		
Tetrahydrofuran	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Toluene	-	-	-	-	-	-	-	-	-	-	-	-	NA	-	-		
Trichloroethene	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Total xylene(s)	-	-	-	-	-	-	-	-	-	-	-	-	NA	-	-		
Vinyl Acetate	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-		
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-	7.6	20	3.9	-		
Unknowns	-	-	-	-	-	-	-	-	-	-	-	-	NA	-	-		
Total of TICs																35.1	

Table is based on data provided by IDEM

**Bold concentrations exceed screening criterion**

"-"= Analyte below detection limit

NA= not applicable, not available, or not analyzed as appropriate

J = Concentrations estimated due to g/c qualifier

R = Spike Sample recovery not within control limits - value not used in screening evaluation

UJ = Concentrations are below detection limit and estimated due to quality control qualifier

B = Blank contaminated

MCL = Maximum Contaminant Level

TABLE 4  
SUMMARY OF VOCs RESULTS  
FEBRUARY 1994 TO  
OCTOBER 2005

OPERATION AND MAINTENANCE REPORT  
LAKE SANDY JO SUPERFUND SITE #7500077  
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Sample Location Date IDEM No.	MW-023R 11/03/04 LQ1861	MW-023R Sep-03 LQ0764	MW-023R Jun-03 LQ0474	MW-023R Mar-03 LQ0154	MW-023R* Mar-03 LQ0155	MW-023R Aug-94 RK8818	MW-023R Aug-94 RK 9693	MW-023R Aug-94 RK 9694	MW-023R Nov-94 RO 1042	MW-023R Feb-95 RO 1318	MW-023R May-95 RO 1570	MW-023R Nov-95 RO 2089	MW-023R May-96 RO 2517	MW-023R Aug-96 RO 2734	MW-023R Dec-96 RO2884	MW-023R Feb-97 RO2980
<b>Volatile Organic Compounds (µg/l)</b>																
1,1 dichloroethane		-	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2 dichloroethane	<1	-	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene																
1,2,4-Trimethylbenzene		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-butanone		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-hexanone		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone		-	-	-	-	-	-	-	-	46	-	-	23	-	-	-
Acrolein		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acrylonitrile		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	8.1	-	-	-	4.2	-	-	-	-	-	-	-	-	-	-	-
Bromoform		-	-	-	-	-	-	-	-	-	5 UJ	-	-	-	-	-
Carbon Disulfide		-	-	-	-	-	-	-	-	-	16	-	-	-	-	-
Chlorobenzene	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	<2	-	-	-	2.4	-	-	-	-	-	-	-	-	-	-	-
Chloroform		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
m/p xylene		-	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride		-	-	-	-	-	-	-	-	-	-	-	-	-	8	-
methyl-T-butyl ether		-	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorofluoromethane		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrahydrofuran		-	-	-	-	-	110	90	93	570	-	77	64	66	68	-
Toluene	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total xylene(s)	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Acetate		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride		-	-	-	-	3.9	-	-	-	-	-	-	-	-	-	-
Unknowns		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total of TICs	57.5															

Table is based on data provided by IDEM

**Bold concentrations exceed screening criterion**

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B = Blank contaminated

MCL = Maximum Contaminant Level

TABLE 4  
SUMMARY OF VOCs RESULTS  
FEBRUARY 1994 TO  
OCTOBER 2005

OPERATION AND MAINTENANCE REPORT  
LAKE SANDY JO SUPERFUND SITE #7500077  
PAGE 12 OF 14

Sample Location Date IDEM No.	MW-023R May-97 RO3232	MW-023R Aug-97 RO3578	MW-023R Dec-97 RO3805	MW-023R Feb-98 RO4104	MW-023R May-98 RO4326	MW-023R Aug-98 RO4571	MW-023R du Aug-98 RO4578	MW-023R Dec-98 RO4842	MW-023R Feb-99 RO5306	MW-024 10/24/08 LQ2890	MW-024 Mar-03 LQ0158	MW-025 Dec-02 TK7153	MW-025 Aug-02 RO9718	MW-027 04/14/05 LQ-2183	MW-027 11/03/04 LQ1868	MW-027 Sep-03 LQ0765	MW-027 Jun-03 LQ0478	MW-027 Mar-03 LQ0156
<b>Volatile Organic Compounds (ug/l)</b>																		
1,1 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA		-	NA	-			-	-	-
1,1,1-trichloroethane	-	-	-	-	-	-	-	-	-		-	NA	-		<1	-	-	-
1,2 dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	-	-	-		<1	-	-	-
1,2-Dichloroethene										<1								
1,2,4-Trimethylbenzene	-	-	-	-	-	1.5 N	-	-	-		-	NA	NA			-	-	-
2-butanone	-	-	-	-	-	-	-	-	-		-	NA	NA			-	-	-
2-hexanone	-	-	-	-	-	-	-	-	-		-	NA	NA			-	-	-
Acetone	-	-	-	-	-	-	-	-	-		-	NA	NA			-	-	-
Acrolein	-	-	-	-	-	-	-	-	-		-	NA	NA			-	-	-
Acrylonitrile	-	-	-	-	-	-	-	-	-		-	NA	NA			-	-	-
Benzene	-	6	5J	4.1	-	5.6	5.7	6.5	-	<1	-	-	-	<1	<1	-	-	-
Bromoform	-	-	-	-	-	-	-	-	-		-	NA	NA			-	-	-
Carbon Disulfide	-	-	-	-	-	-	-	-	-		-	NA	NA			-	-	-
Chlorobenzene	-	-	-	-	-	-	-	-	-	<1	-	-	NA	<1	<1	-	-	-
Chloroethane	-	-	7	3.5	-	1.7	1.6	5.4	-	<2	-	-	-	<2	<2	-	-	-
Chloroform	-	-	-	-	-	-	-	-	-		-	NA	NA			-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	-		-	NA	NA	<1	<1	-	-	-
Isopropylbenzene	-	-	-	-	-	-	-	-	-	<1	-	-	NA		<1	-	-	-
m/p xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	-	NA	-			-	-	-
Methylene Chloride	7R	-	-	-	-	-	-	7.3	-	<1	-	NA	1.4			-	-	-
methyl-T-butyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	-	NA	-			-	-	-
Tetrachlorofluoromethane	-	-	-	-	-	-	-	-	-	<1	-	NA	NA			-	-	-
Tetrahydrofuran	-	-	-	-	41	47	71	-	-	<1	-	NA	NA			-	-	-
Toluene	-	-	-	-	-	-	-	-	-	<1	-	-	NA	<1	<1	-	-	-
Trichloroethene	-	-	-	-	-	-	-	-	-	<1	-	NA	NA			-	-	-
Total xylene(s)	-	-	-	-	-	-	-	-	-	<1	-	-	NA	<1	<1	-	-	-
Vinyl Acetate	-	-	-	-	-	-	-	-	-		-	NA	NA			-	-	-
Vinyl Chloride	-	-	-	-	-	-	-	-	-		-	-	-			-	-	-
Unknowns	-	-	-	-	-	-	-	-	-		-	-	NA			-	-	-
Total of TICs															235.0			

Table is based on data provided by IDEM

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B = Blank contaminated

MCL = Maximum Contaminant Level

TABLE 4  
SUMMARY OF VOCs RESULTS  
FEBRUARY 1994 TO  
OCTOBER 2005

OPERATION AND MAINTENANCE REPORT  
LAKE SANDY JO SUPERFUND SITE #7500077  
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Sample Location Date IDEM No.	MW-027 Aug-02 RO9712	MW-027 Feb-95 RO1319	MW-027 May-95 RO1572	MW-027 Nov-95 RO2090	MW-027 May-96 RO2519	MW-027 Aug-96 RO2728	MW-027 Dec-96 RO2885	MW-027 Feb-97 RO2978	MW-027 May-97 RO3234	MW-027 Aug-97 RO3586	MW-027 Dec-97 RO3813	MW-027 Feb-98 RO4105	MW-027 May-98 RO4316	MW-027 Aug-98 RO4573	MW-027 Dec-98 RO4833	MW-027 Feb-99 RO5308	MW-023R Sep-03 LQ0763	Trip Blank LQ2897	Trip Blank 04/14/05 LQ-2184
<b>Volatile Organic Compounds (µg/l)</b>																			
1,1 dichloroethane	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-		
1,1,1-trichloroethane	-	-	-	-	-	-	-	-	-	-	-	-	-	23	-	-	-		
1,2 dichloroethane	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-		
1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1,2,4-Trimethylbenzene	NA	-	-	-	-	-	-	-	-	-	-	-	-	1.1 N	-	-	-		
2-butanone	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2-hexanone	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Acetone	NA	23	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-		
Acrolein	NA	-	50 UJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Acrylonitrile	NA	-	70 UJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Benzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Bromoform	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Carbon Disulfide	NA	-	5 UJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Chlorobenzene	NA	NA	NA	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-		
Chloroethane	7.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Chloroform	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Ethylbenzene	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Isopropylbenzene	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
m/p xylene	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-		
Methylene Chloride	-	-	-	-	-	-	8	-	8J	-	-	-	-	1.2	-	-	-		
methyl-T-butyl ether	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-		
Tetrachlorofluoromethane	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Tetrahydrofuran	NA	-	-	-	-	-	62	-	-	-	-	-	61	37	-	71	-		
Toluene	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Trichloroethene	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Total xylene(s)	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Vinyl Acetate	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Unknowns	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Total of TICs																			

Table is based on data provided by IDEM

**Bold concentrations exceed screening criterion**

"-"= Analyte below detection limit

NA= not applicable, not available, or not analyzed as appropriate

J = Concentrations estimated due to q/c qualifier

R = Spike Sample recovery not within control limits - value not used in screening evaluation

UJ = Concentrations are below detection limit and estimated due to quality control qualifier

B = Blank contaminated

MCL = Maximum Contaminant Level

TABLE 4  
SUMMARY OF VOCs RESULTS  
FEBRUARY 1994 TO  
OCTOBER 2005

OPERATION AND MAINTENANCE REPORT  
LAKE SANDY JO SUPERFUND SITE #7500077  
PAGE 14 OF 14

Sample Location Date IDEM No.	Trip Blank* 11/04/04 LQ1874	Trip Blank Sep-03 LQ0769	MW-027EB Jun-03 LQ0477	Trip Blank LQ0479	MW-024EB Mar-03 LQ0157	Trip Blank Mar-03 LQ0160	Trip Blank May-98 RO4309	Trip Blank May-98 RO4310	Field Blank May-98 RO4314	Trip Blank Aug-98 RO4576	Field Blank Aug-98 RO4569	Trip Blank Dec-98 RO4845	Field Blank Dec-98 RO4844	Trip Blank Feb-99 RO5314	Field Blank Feb-99 RO5312	Trip Blank Sep-02 RO9719	Trip Blank Dec-02 TK7154
<b>Volatile Organic Compounds (µg/l)</b>																	
1,1 dichloroethane		-	-	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA
1,1,1-trichloroethane	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA
1,2 dichloroethane	<1	-	-	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
1,2-Dichloroethene																	
1,2,4-Trimethylbenzene		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
2-butanone		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
2-hexanone		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Acetone		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Acrolein		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Acrylonitrile		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Benzene	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Carbon Disulfide		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Chlorobenzene	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	-
Chloroethane	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Ethylbenzene	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Isopropylbenzene	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	-
m/p xylene		-	-	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA
Methylene Chloride		-	-	-	-	-	-	-	-	-	2	-	-	-	-	0.063	NA
methyl-T-butyl ether		-	-	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA
Tetrachlorofluoromethane		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Tetrahydrofuran		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Toluene	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	-
Trichloroethene		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Total xylene(s)	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	-
Vinyl Acetate		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	NA
Vinyl Chloride		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknowns		-	-	-	-	-	-	-	-	-	-	-	-	-	-	NA	-
Total of TICs																	

Table is based on data provided by IDEM

**Bold concentrations exceed screening criterion**

"-"= Analyte below detection limit

NA= not applicable, not available, or not analyzed as appropriate

J = Concentrations estimated due to q/c qualifier

R = Spike Sample recovery not within control limits - value not used in screening evaluation

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MCL = Maximum Contaminant Level



**Attachment 3**  
**Photos of Site Conditions**



Site Entrance



Site surface-facing South



Site surface-facing South



Site surface-facing North





Left to right: MW-008 and MW-007R



MW-009 and MW-010